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(56) Documents Cited

**GB 2163467 A**

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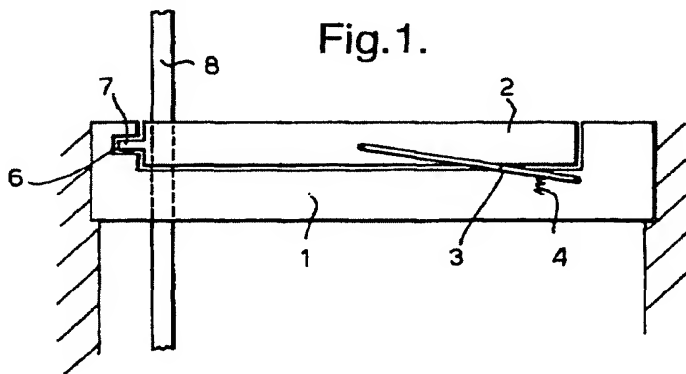
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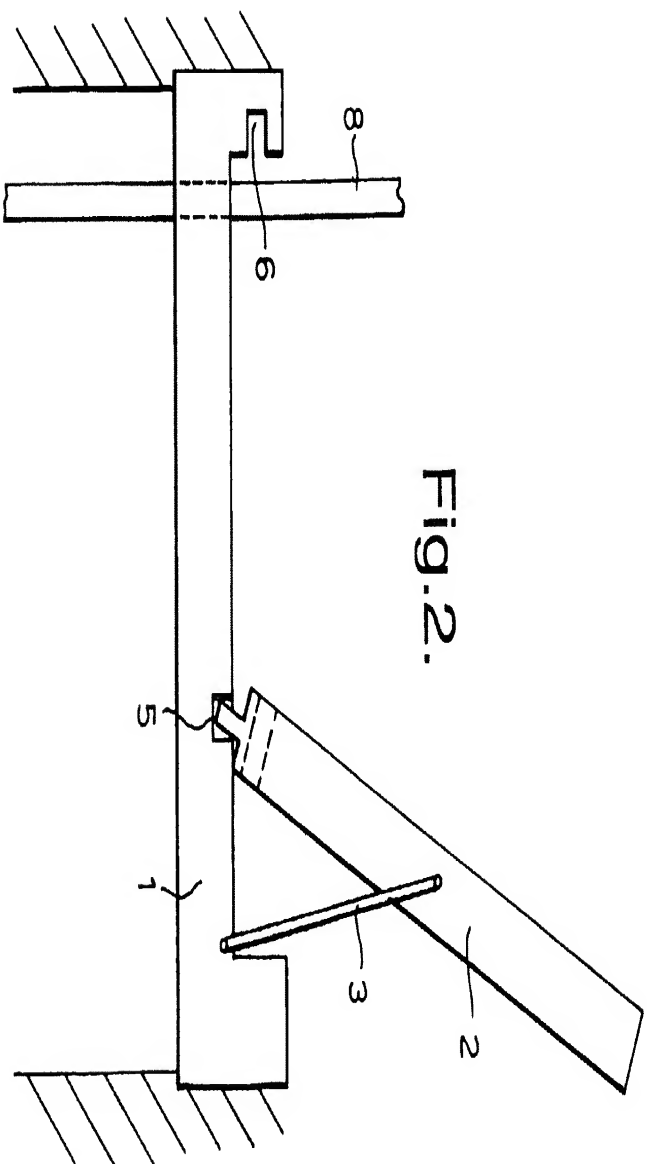
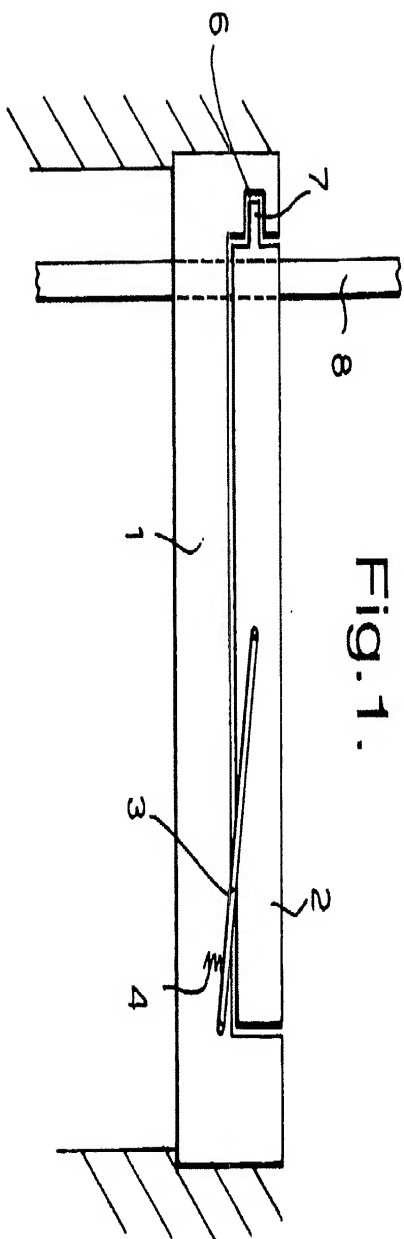
(54) Abstract Title

**Cover with bias means for easier opening**

(57) A cover for a opening comprises a frame (1) defining the opening of the hole, a cover plate (2), biasing means (4) to make the opening of the cover easier, and a support bar (3). One end of the support bar (3) is pivotally connected to the frame (1) and the biasing means (4), whilst the other end of the support bar is pivotally connected to the cover plate (2). When the pivoted end of the cover plate is lifted vertically, the opposite end of the cover plate slides along the frame towards the end of the frame from which the cover plate is being lifted. This means that throughout the opening of the cover, the cover plate remains between the user and the hole, reducing the risk of the user falling into the hole. Such a cover is particularly useful for a inspection chamber or other hole in the ground.



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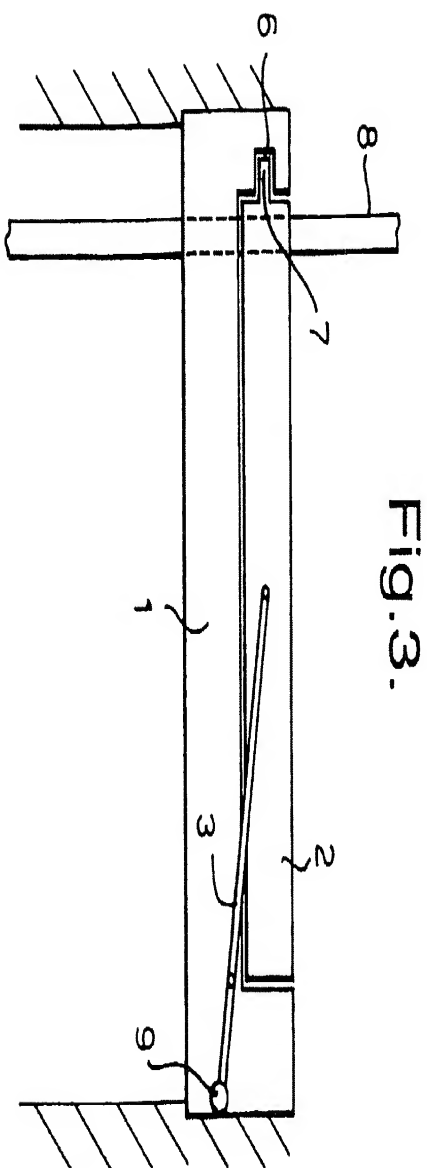


Fig. 3.

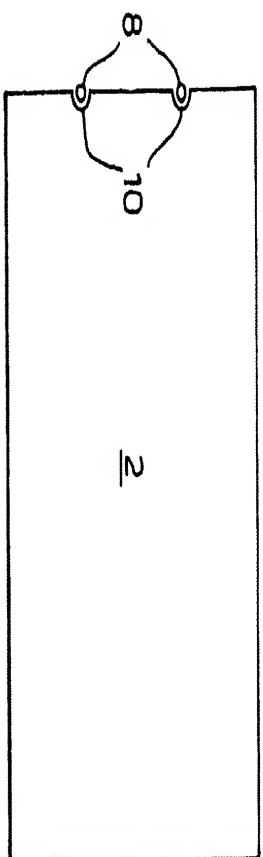


Fig. 4.

COVER

The present invention relates to a cover for an opening, and in particular to a cover for an inspection  
5 chamber or other hole in the ground.

Conventionally, covers for holes include either a lift-off cover plate or a hinged cover plate. Lift-off cover plates are not connected to the frame surrounding the opening of the hole, and are generally lifted vertically  
10 out of the frame, and are then moved sideways to open the hole. Especially with large holes, the cover plate is heavy and it is therefore necessary to use a crane or other lifting device to remove it.

Hinged cover plates are hinged to the frame defining the opening of the hole along one edge. To open the cover plate, a user can either stand at the side of the hole and lift the free end of the cover plate, pivoting the cover about the hinge, or can stand at the opposite end of the cover plate to that hinged to the frame and again lift the  
15 cover plate. In either case, the user must lift the cover plate in such a way that the hole opens in front of him. It will be appreciated that this is dangerous since the user may be off balance, especially when lifting a heavy cover plate, and there is a danger the user will fall into  
20 the hole.

It is known that existing hinged cover plate may include a biasing means, for example a spring or counter balance to help offset the weight of the cover plate when this is opened. This is especially useful for larger cover  
25 plates, for example those covering holes one metre square or larger in which the weight of the cover plate is likely to exceed 50 kilograms which is the recommended maximum lift for a single person.

Another problem with hinged cover plates is that it is very difficult to form a gas tight seal over the hole. To  
35 form a gas tight seal it is necessary to provide a compressible sealing member or gasket which is compressed

between the cover plate and the frame. With a hinged cover plate, there is relatively little movement between the cover plate and frame adjacent the hinge compared to that at the opposite end of the cover plate, and therefore an  
5 extremely high compressive force is generated adjacent the hinge and a low force at the opposite side. This variation of force will lead to rapid failure of the gasket adjacent to the hinge.

Hinged cover plates must generally be of a regular  
10 shape, having at least one straight edge along which the hinge is provided. It is therefore not possible to have a hinged circular cover plate.

A further problem with the conventional hinged cover plates is their poor security in that the weakest part of  
15 the holding of the cover plate is the hinge which is exposed and this can easily be broken, for example by vandals.

A still further problem of the known hinged cover plate is that it is difficult to ensure that these have a  
20 flush finish with the surround of the opening, and accordingly there is a danger that people may trip over the edge of the cover plate.

A yet further problem with hinged cover plate is that it is not possible to provide anything directly over the  
25 cover plate since this will interfere with its opening. This is a particular problem with ladders, pipes or rails extending out of the hole, since these must either be set back from the edge of the hole, which in the case of a ladder is disadvantageous as the rungs of the ladder above  
30 the hole are not aligned with the rungs of the ladder inhole making it easy for a person to fall, or must be fitted as extensions after the cover plate is opened.

According to the present invention a cover for a hole comprises a cover plate, a frame defining the opening of  
35 the hole, a support bar one end of which is pivotally connected to the frame and the other end of which is

pivotaly connected to the cover plate, and biasing means for assisting the opening of the cover plate.

With the arrangement in accordance with the present invention, to open the cover plate its end adjacent the pivotal connection between the support rod and the frame is lifted vertically, causing the opposite edge of the cover plate to slide along the frame towards the edge of the frame from which the cover is being opened. The biasing means helps offset the force required to lift the end of the cover plate. In this way, the cover is opened in such a way that the cover plate remains at all times between the user opening the cover and the hole, and thereby prevents the user from falling into the hole even if they lose their balance.

The biasing means may be in the form of a spring bias which urges the support bar to open the cover plate. Alternatively, the biasing means may be in the form of a counterbalance, and this may comprise an extension to the support bars extending into the hole, with the end of the support bar opposite the pivotal connection with the cover plate including a weight which creates a moment to offset the weight of the plate. In this case the biasing means may be in the form of a torsion bar.

The pivotal connection between the support bar and the cover plate is preferably provided approximately half way between the edge of the cover plate adjacent the pivotal connection between the support bar and the frame and the opposite edge. This ensures that the cover plate can be lifted to an upright position. In any case it is preferred that the pivotal connection between the support bar and the cover plate is provided at about the centre of mass of the cover plate. This helps support the weight of the cover plate as this is opened. The pivotal connection between the cover plate and the support bar may be slightly behind the centre of mass in the direction from the opening end of the cover plate to the opposite end of the cover plate to ensure that the opposite end of the cover plate remains in

contact with the frame as the cover plate is opened thereby to ensure that the cover plate remains upright when the plate is fully opened. Alternatively, further biasing means such as a counterbalance or spring bias can be used  
5 to provide a turning moment to ensure a cover plate is correctly positioned.

Advantageously two support bars are provided and are pivotally connected to opposed ends of one side of the frame and opposed side of the cover plate. This prevents  
10 unwanted twisting of the cover plate.

It is preferred that the end of the cover plate opposite the end of the pivotal connection between the support bar and the frame includes a projection, and the frame includes a corresponding hole into which the  
15 projection fits when the cover plate is closed. When closing the cover plate, the final part of the closing is by generally horizontal movement, and therefore the projection slides into the hole in the frame. This provides additional security as it is not possible to lift  
20 that end of the cover plate. The other end of the cover plate may be secured to the frame by a bolt.

Advantageously, a sealing member or gasket is provided around the periphery of the frame, and when the cover plate is closed, this compresses the sealing member to give a gas  
25 tight seal. The sealing member is compressed by the weight of the cover plate.

It is advantageous for the frame to include at least one notch into which the edge of the cover plate is received when the cover plate is fully opened. This  
30 provides additional support for the cover plate which helps prevent the cover plate accidentally sliding closed.

An example of a cover in accordance with the present invention will now be described with reference to the accompanying drawings; in which:-

35 Figure 1 shows a side view of the cover when closed;  
Figure 2 shows a side view of the cover of Figure 1 when opened;

Figure 3 shows an alternative example of a cover including a counterbalance biasing means; and,

Figure 4 shows a plan view of a cover plate.

As shown in Figure 1, the cover comprises a frame 1 which surrounds the opening of a hole, and a cover plate 2 which fits within the frame 1. A pair of support bars 3 are pivotally connected to opposite ends of one edge of the frame 1, and are pivotally connected at their other ends to the cover plate 2, substantially at the centre of mass of the cover plate 2 in the direction from the edge of the frame 1 to which the bars 3 are mounted to the opposite edge. A spring biasing means 4 is provided to urge the support bars 3 upwards. A gasket (not shown) is provided around the periphery of the frame 1, and when the cover plate 2 is closed, the gasket is sandwiched between the cover plate 2 and the frame 1.

To open the cover, a user lifts the end of the cover plate 2 adjacent the edge of the frame 1 to which the support bars 3 are pivotally connected. The spring biasing means 4 assist the user in lifting the edge of the plate 2. As the plate 2 is lifted, the opposite edge of the plate 2 slides along the frame 1 towards the edge where the support bars 3 are pivotally connected thereby opening the hole. When the cover plate 2 is fully opened, i.e. it is upright, the edge of the cover plate 2 is received by recesses 5 in the frame 1 thereby holding the cover plate 2 in place and preventing it from accidentally sliding closed.

The edge of the frame 1 opposite to the edge to which the support bars 3 are pivotally connected includes two horizontally extending recesses 6. The edge of the cover plate 2 includes corresponding projections 7. As the cover plate 2 is closed, the cover plate 2 assumes a generally horizontal position, and the projections 7 slide into the recesses 6 in the frame 1. When the cover plate 2 is closed, this prevents the edge of the cover plate 2 from being vertically lifted out of the frame 1. The opposite



edge of the cover plate 2 may be provided with a shoot bolt (not shown) to hold this edge in place.

As shown in Figure 3, the spring bias may be replaced by a counterbalance 9. In this case, the support bars 3 extend beyond the pivotal connection between the support bars 3 and the frame 1, and include a counterbalance weight 9 on the ends opposite the pivotal connection with the cover plate 2. This counterbalance 9 creates a moment urging the opening of the cover plate 2 allowing this to be lifted more easily.

With the cover plate 2 according to the present invention, as the initial movement of the edge of the cover plate 2 opposite to the edge of the frame 1 to which the support bars 3 are connected on opening and the final movement on closing the cover plate 2 is generally horizontal, it is possible to provide objects directly over that edge of the hole without restricting the opening of the cover plate 2. This is particularly advantageous where the hole includes ladders 8 or runners extending up the side of the hole since these ladders 8 or runners can be extended above the side of the hole without affecting the opening of the cover plate 2. In this case, the cover plate 2 may include the small recess 10 on the edge of the plate 2 as shown in Figure 4 to allow the ladder 8 or runner to project through the cover plate 2. It is particularly advantageous to have a continuous ladder 8, since with prior art covers it has been necessary to offset the ladder 8 above ground back from the edge of the hole to allow the opening of the cover plate, and in this case when a user climbs up or down the ladder, the rungs above the hole are not in the expected position, meaning that the user is off-balance as he enters or leaves the hole, again with the risk that the user may fall down the hole.

Although the present invention has been described with respect to a generally horizontal opening for a large hole, the invention is equally applicable to vertical openings, for example window frames or doors, or to smaller openings,

for example ground mounted plug sockets or terminals where a simple cover which can be flush fitted to the floor is required.

5       Whilst the cover described is a rectangular cover, it will be appreciated that any shape of cover, including a circular cover, may be used.

CLAIMS

1. A cover for a hole comprising a cover plate, a frame  
5 defining the opening of the hole, one end of the support  
bar being pivotally connected to the frame, and the other  
end of the support bar being pivotally connected to the  
cover plate and a biasing means for assisting the opening  
of the cover plate.
- 10 2. A cover according to claim 1, in which the biasing  
means is in the form of a spring bias which urges the  
support bar to open the cover plate.
- 15 3. A cover according to claim 2, in which the spring bias  
is provided by a torsion bar.
4. A cover plate according to claim 1, in which the  
biasing means is in the form of a counterbalance.
- 20 5. A cover plate according to claim 4, in which the  
counterbalance is provided by an extension to the support  
bar extending into the hole, the end of the support bar  
opposite the pivotal connection with the cover plate  
25 including a weight which increases a moment to offset the  
weight of the plate.
6. A cover according to any one of the preceding claims,  
in which the pivotal connection between the support bar and  
30 the cover plate is provided approximately half way between  
the edge of the cover plate adjacent the pivotal connection  
between the support bar and the frame and the opposite  
edge. In any case it is preferred that the pivotal  
connection between the support bar and the cover plate is  
35 provided at the centre of mass.

7. A cover plate according to any one of the preceding claims, in which the pivotal connection between the cover plate and the support bar is slightly behind the centre of mass in the direction from the opening end of the cover plate to the opposite end of the cover plate to ensure that the opposite end of the cover plate remains in contact with the frame as the cover plate is opened to thereby ensure that the cover plate remains upright when the plate is fully opened.

10

8. A cover substantially as described with reference to the accompanying drawings.

CLAIMS

1. A cover for a hole comprising a cover plate, a frame defining the opening of the hole, a support bar having a first end pivotally connected to the frame and a second end pivotally connected to the cover plate, and a biasing means for assisting the opening of the cover plate, wherein the cover is opened by pivoting the cover plate such that a first edge of the cover plate moves substantially parallel to the frame and a second edge opposed to the first edge of the cover plate moves substantially perpendicular to the frame to move the cover plate into a position substantially perpendicular to the frame.
2. A cover according to claim 1, in which the biasing means is in the form of a spring bias which urges the support bar to open the cover plate.
3. A cover according to claim 2, in which the spring bias is provided by a torsion bar.
4. A cover according to claim 1, in which the biasing means is in the form of a counterbalance.
5. A cover according to claim 4, in which the counterbalance is provided by an extension to the support bar extending into the hole, the end of the support bar opposite the pivotal connection with the cover plate including a weight which increases a moment to offset the weight of the plate.
6. A cover according to any one of the preceding claims, wherein a sealing member or gasket is provided around the periphery of the frame which is compressed by the cover plate when the cover is closed.
7. A cover according to any one of the preceding claims, in which the edge of the cover plate opposed to the pivotal connection between the support bar and the frame includes a projection which fits into a corresponding hole in the frame when the cover is closed.

8. A cover according to any one of the preceding claims, in which at least one notch is provided in the frame into which an edge of the cover plate is received when the cover plate is fully open.

5 9. A cover according to any one of the preceding claims, in which the pivotal connection between the support bar and the cover plate is provided approximately half way between the edge of the cover plate adjacent the pivotal connection between the support bar and the frame and the  
10 opposite edge.

10. A cover according to any one of the preceding claims in which the pivotal connection between the support bar and the cover plate is provided at the centre of mass of the cover plate.

15 11. A cover according to any one of claims 1 to 9, in which the pivotal connection between the cover plate and the support bar is slightly behind the centre of mass of the cover plate in the direction from the opening end of the cover plate to the opposite end of the cover plate to  
20 ensure that the opposite end of the cover plate remains in contact with the frame as the cover plate is opened to thereby ensure that the cover plate remains upright when the plate is fully opened.

25 12. A cover according to any one of the preceding claims, comprising two support bars having first ends pivotally connected to one side of the frame and second ends pivotally connected to opposing sides of the cover plate.

30 13. A cover substantially as described with reference to the accompanying drawings.



Application No: GB 9811857.3  
Claims searched: 1-8

Examiner: Caroline Marshall  
Date of search: 30 June 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): E1G

Int Cl (Ed.6): E02D 29/14, F16J 13/00

Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2 163 467 A <i>JS</i> (Turner Bros) - see whole document, especially lines 86-92 of page 1, and figs. 2-5.	4 and 5
X, Y	EP 0 085 433 A2 <i>JS</i> (Neu) - see whole document, especially fig. 1.	X: 1, 2 Y: 3-5
X, Y	US 5 507 590 <i>JS</i> (Argandona) - see whole document, especially fig. 1.	X: 1, 6-7 Y: 3-5
Y	US 4 669 625 <i>JS</i> (Garsite Products Inc) - see whole document, especially lines 42-68 of col. 1, and figs. 2-3.	3

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